

Test report # PF23015

Test Number 23015

Client: Tech Coatings NZ Limited

**Fire resistance test for the timber penetrations
through the wall**

Test method: AS 1530.4:2014

Report Date 12/07/2023

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1.1 Document revision schedule

Revision #	Date	Description
1	04/06/2023	Initial Issue for Client review
2	12/07/2023	Issued to Client

1.2 Signatories

Report	Name	Signature	Date
Prepared by:	Alexey Kokorin (Technical Manager)		12/07/2023
Authorized by:	Andrew Bain (Authorized signatory)		12/07/2023



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

2. Contact details

2.1 IANZ registered Testing Laboratory

Fire TS Lab - Passive Fire Inspection and Test Services Ltd

Accreditation N^o: 1335

1/113 Pavilion Drive, Mangere, Auckland, 2022

New Zealand

Contact e-mail: tests@firelab.co.nz

2.2 Client/Applicant

Tech Coatings NZ Limited

12 Tokomaru Street, Welbourn, New Plymouth, 4312

New Zealand

E-mail: shanew@techcoatings.co.nz

2.3 Manufacturer/Supplier

Intumescent coating – FBL-100 paint:

Tech Coatings NZ Limited

12 Tokomaru Street, Welbourn, New Plymouth, 4312

New Zealand

PFP materials – various suppliers

3. Test Results

Specimen #	Service	Actual Integrity (min)	Actual insulation (min)	FRL*
A	90x45mm Timber Purlin with 13mm FR plasterboard on the top (fire side only)	62 NF	62 NF	-/60/60
B	90x45mm Timber Purlin with 19mm plywood on the top (fire side only)	62 NF	60	-/60/60
C	90x45mm Timber Purlin	62 NF	62 NF	-/60/60
D	283x45mm Timber Purlin	62 NF	62 NF	-/60/60

All specimens had asymmetrical assembly, results apply if exposed to fire as tested.

NF – No failure during the test

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The test results relate to the specimens of the product in the form in which they were tested. Differences in the composition or thickness of the product may significantly affect the performance during the test and may therefore invalidate the test results. Care should be taken to ensure that any product, which is supplied or used, is fully represented by the specimens, which were tested.

The specimens were supplied by the sponsor and the Laboratory was not involved in any of selection or sampling procedures.

The results of this fire test may be used to directly assess fire hazard, but it should be recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions.

4. Test Details

Test Specification Fire Resistance:

Failure shall be deemed to have occurred when one of the following occurs:

- a) the temperature at any location on the unexposed face of the test specimen exceeds the initial temperature by more than 180 °C
- b) Integrity failure shall be deemed to have occurred upon ignition of the cotton pad when glowing or flaming occurs or for a period of 30 seconds.
- c) Flaming to the unexposed face for 10 seconds or longer shall be deemed to be an Integrity failure.

Testing scope:

AS 1530.4-2014 Section 10 Service penetrations and control joints

Documentation:

Testing products were verified and tested based on Client description, refer to Specimens description below.

Testing date:

08/03/2023

Installation completion date:

06/02/2023

Specimens conditioning and delivery to Laboratory:

Separating element was built by Laboratory in line with Client instructions. Installation of fire stopping system was performed by Laboratory. Coating application was performed by Client. The Laboratory was not involved in sampling of the materials. Laboratory verified materials during construction of the specimen.

Termination of The Test:

The test was discontinued at 63 minutes.



Use of Reports:

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This report details the methods of construction, test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in AS 1530.4. Any significant variation with respect to size, constructional details, loads, stresses, edge or end conditions, other than that allowed under the field of direct application in the relevant test method, is not covered by this report.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.



5. Equipment

Furnace:

1200X1200 Indicative Furnace designed to operate to AS1530.4:2014

Temperature:

Furnace Temperature measurements were controlled with four 3mm Type K MIMS thermocouples set within 50-100 mm from the face of the specimens in line with AS1530.4-2014. All thermocouples are calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.

Pressure measurement:

Kepware Siemens Data logging system including multi-channel recording data at 5 second intervals. Calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.

Ambient Temperature:

Ambient temperature was recorded 15 minutes before the test was commenced, at the start of the test and monitored during the test. All thermocouples are calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation Corporation (ILAC) through their MRA to the accuracy required by AS 1530.4-2014.

Specimen thermocouples:

Specimen thermocouples were installed to the unexposed face. Type K copper disk thermocouples fixed within the required locations referenced from AS1530.4-2014. Thermocouples are calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation Corporation (ILAC) through their MRA to the accuracy required by AS 1530.4-2014.

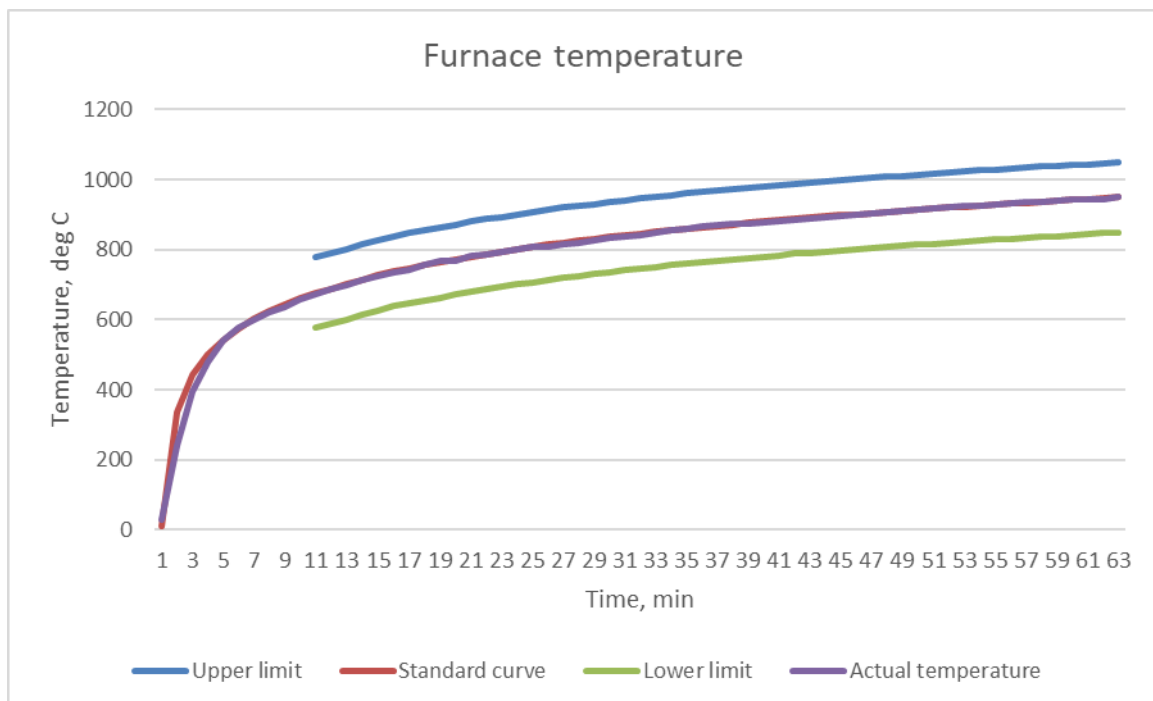
Dimensional measurements:

All linear measurements were made with equipment calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.

6. Test Conditions

6.1 Furnace Temperature

The furnace was controlled to follow the temperature/time relationship specified in AS 1530.4-2014.

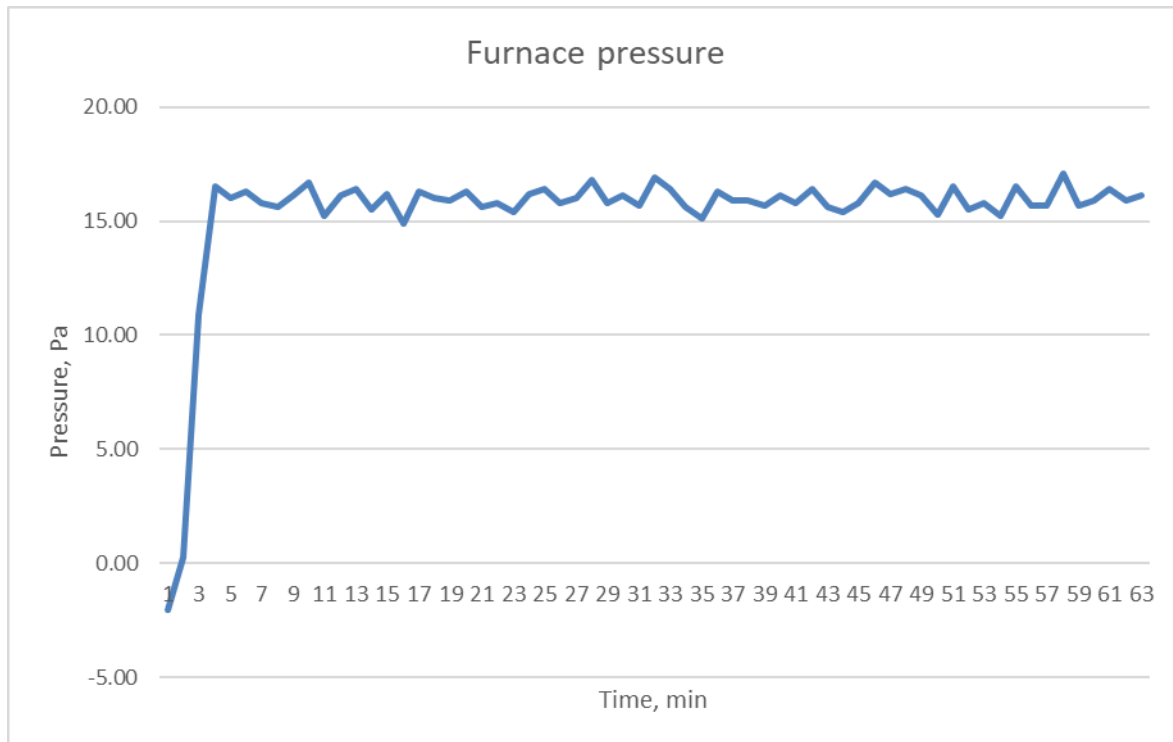


6.2 Ambient Temperature

The ambient temperature of the test area 15 minutes before the test and at the commencement of the test was 23 °C.

6.3 Pressure Readings

The probe was located 500mm above the furnace floor.



7. Schedule of materials

Separating Element		
1.1	Item / Product Name	Timber Frame and Fr plasterboard separating element
	Measurements	Width / Height (W/H): 1200 x 1200mm
		Thickness (T): 116mm
Installation	<p>The separating element was constructed by the laboratory. The separating element consisted of a timber top and bottom plate, three studs and two nogs (1.2). The top plate, bottom plate and two studs were fixed to the perimeter of the refractory frame. The additional stud was installed at 600mm centres. The nogs were installed at 600mm centres. All timber was fixed using framing nails (4.1) Each face of the timber frame was then lined with one layer of plasterboard (1.3), fixed with screws (4.2) at 300mm centres. The apertures were then cut from the plasterboard, with one aperture centred in each quarter of the timber frame.</p>	

1.2	Item / Product Name	Laser Frame Timber SG8
	Measurements	Width / Height (W/H): 90 x 45 mm
	Installation	Used to construct separating element
1.3	Item / Product Name	GIB Fyreline Plasterboard
	Measurements	Width / Height (W/H): 1200 x 3000 mm
		Thickness (T): 13mm
Installation	Used to construct separating element	

Services		
2.1	Item / Product Name	Timber Purlin
	Measurements	Width / Height (W/H): 90 x 45 mm
	Additional Info	Specimen A, B, C

2.2	Item / Product Name	Timber Purlin
	Measurements	Width / Height (W/H): 285mm x 45mm (nominal)
	Additional Info	Specimen D

Sealants / Coatings		
3.1	Item / Product Name	GIB Fire Soundseal
	Measurements	310mL tube
	Installation	Installed between pattress and service
3.2	Item / Product Name	FBL-100 coating
	Measurements	20L Bucket
	Installation	Applied to purlins on top of primer.

Fixings		
4.1	Item / Product Name	Paslode Framing Nails
	Measurements	90mm
	Installation	Used to fix timber studs
4.2	Item / Product Name	GIB Grabber Self Tapping Screws
	Measurements	41mm
	Installation	Used to fix plasterboard to timber frame Used to fix pattresses to top of timber purlin

Additional Fire protection products		
5.1	Item / Product Name	GIB Fyreline Plasterboard
	Measurements	Width / Height (W/H): 1200 x 3000 mm
	Thickness	Thickness (T): 13mm
	Installation	Pattresses cut from plasterboard, installed to top of specimen
5.2	Item / Product Name	19mm Plywood

	Measurements	Width / Height (W/H): 1200 x 1200 mm
	Thickness	Thickness (T): 19mm
	Installation	Pattresses cut from plasterboard, installed to top of specimen

8. Test Specimens instrumentation

8.1 Thermocouple Positions Table

Sp#	TC#	THERMOCOUPLE LOCATION DESCRIPTION
A	1	On separating element, mid-width of the purlin, 25mm above the purlin
A	2	On separating element, mid-height of the purlin, 25mm right of the purlin
A	3	On Purlin, top side of purlin, mid-width of purlin, 25mm from separating element
A	4	On Purlin, right side of purlin, mid-height of purlin, 25mm from separating element
B	5	On separating element, mid-width of the purlin, 25mm above the purlin
B	6	On separating element, mid-height of the purlin, 25mm right of the purlin
B	7	On Purlin, top side of purlin, mid-width of purlin, 25mm from separating element
B	8	On Purlin, right side of purlin, mid-height of purlin, 25mm from separating element
C	9	On separating element, mid-width of the purlin, 25mm above the purlin
C	10	On separating element, mid-height of the purlin, 25mm right of the purlin
C	11	On Purlin, top side of purlin, mid-width of purlin, 25mm from separating element
C	12	On Purlin, right side of purlin, mid-height of purlin, 25mm from separating element
D	13	On separating element, mid-width of the purlin, 25mm above the purlin
D	14	On separating element, mid-height of the purlin, 25mm right of the purlin
D	15	On Purlin, top side of purlin, mid-width of purlin, 25mm from separating element
D	16	On Purlin, right side of purlin, mid-height of purlin, 25mm from separating element

9. Observations

Time Minutes	Test Face	SP#	Observations
4	U	B	Smoke from top of timber purlin
5	U	D	Smoke from top of timber purlin
9	E	ALL	Expansion of coating on specimens
9	E	ALL	Combustion of timber purlins
13	U	A	Smoke from top of timber purlin
16	U	D	Moisture from right side of specimen
20	E	A	Plasterboard Pattress on top of purlin has fallen from specimen
29	U	C	Smoke coming from bottom of timber purlin
30	U	A	Discolouring on left side of purlin
30	U	D	Moisture from all sides of purlin
38	U	D	Discolouring at bottom of purlin
41	U	B	Discolouring at top of purlin
44	E	A, C	Sections of timber purlin have fallen from specimen
48	U	A, D	Further smoke from purlin
62			TEST DISCONTINUED

Key: U = unexposed face. E = Exposed face.

10. Specimens

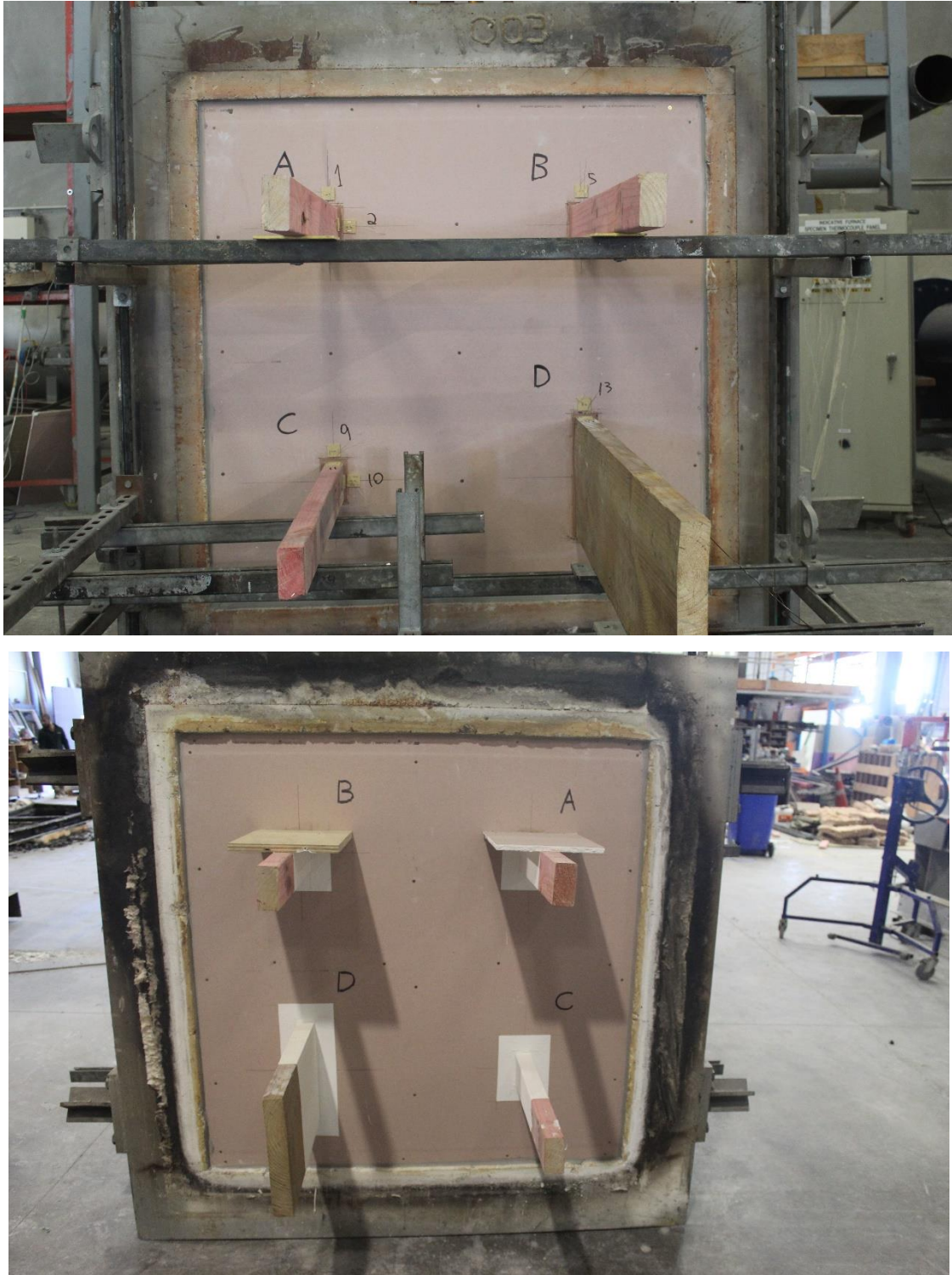


Fig.1 – Test specimens. Unexposed (top) and exposed (bottom) face.

10.1 Specimen A

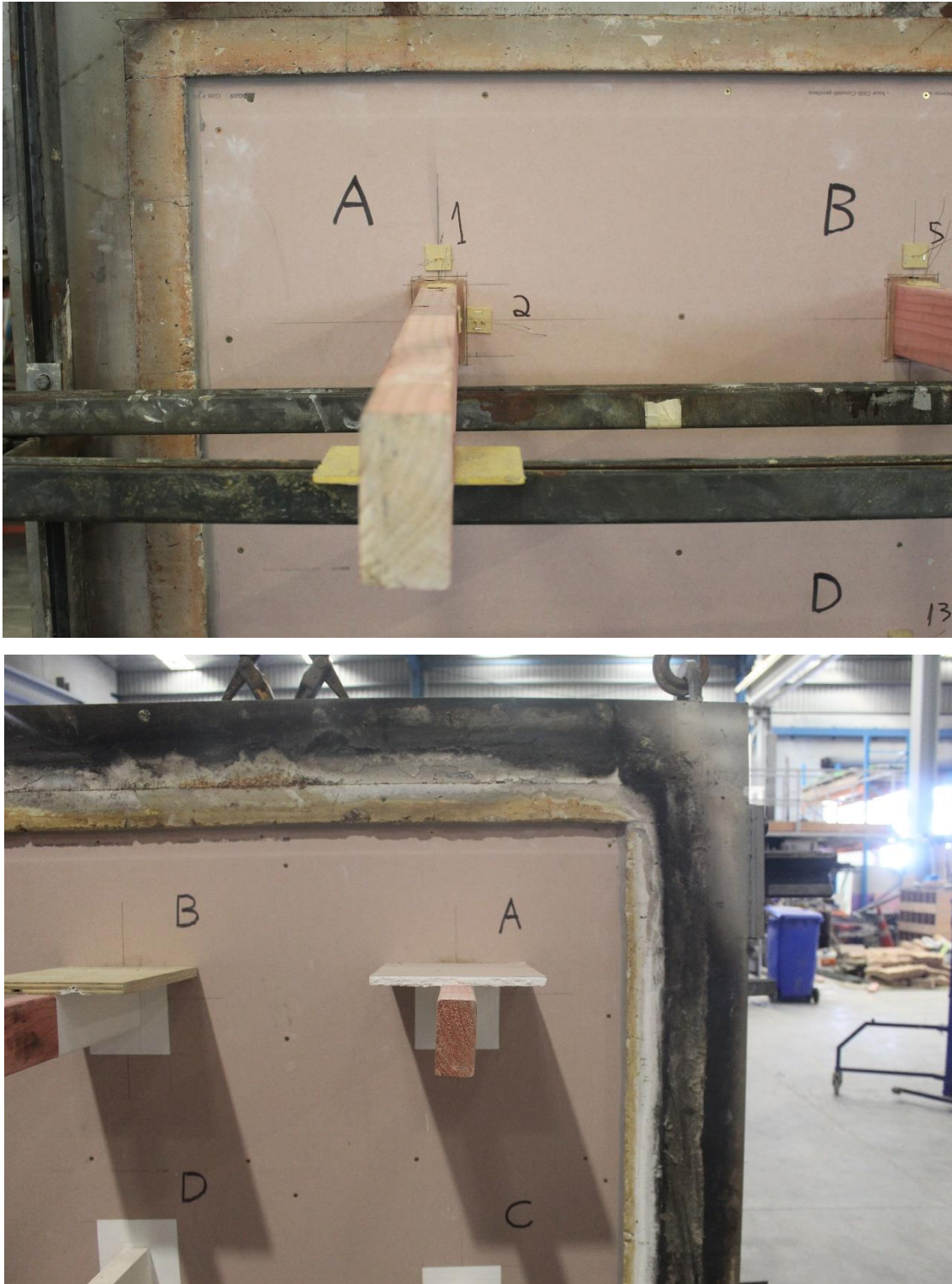


Fig.2 – Specimen A. Unexposed (top) and exposed (bottom) face.

Penetration System		
A	Service	90x45mm Timber Purlin with 13mm FR plasterboard on the top (fire side only)
	System Details	Purlin (2.1), Sealant (3.1), Coating (3.2), Screws (4.2), Plasterboard (5.1)
	Service Support	Unistrut structure at 300mm and 1000mm
	Aperture Size	62mm x 105mm
	Annular Spacing	Min: 5mm Max: 10mm
	Local Fire-stopping Protection	
	Application	Asymmetrical
	Protection Used	<p>The aperture was cut from the separating element, through both faces of the plasterboard. The purlin (2.1) was passed through the aperture, extending 500mm from the exposed face. A bead of sealant (3.1) was applied between the purlin and the separating element, flush with the plasterboard, resulting in a 13mm depth and 5 to 10mm width seal around the service in the annular gap. A plasterboard pattress (5.1) was then cut to 300mm x 200mm, and fixed with three screws (4.2) to the top of the timber purlin on the exposed face. The pattress was flush with the separating element, and overhung the width of the purlin evenly.</p> <p>A coat of FBL-100 coating (3.2) was applied to the purlin and the pattress, with a WFT measurement of 1000µm. The coating was applied to all visible sides of the purlin. The coating was applied to the underside of the pattress, measuring 50mm either side of the purlin. The coating extended 300mm from the exposed face.</p>

Test results

Structural adequacy	Not applicable
Integrity	No failure at 62 min
Insulation	No failure at 62 min

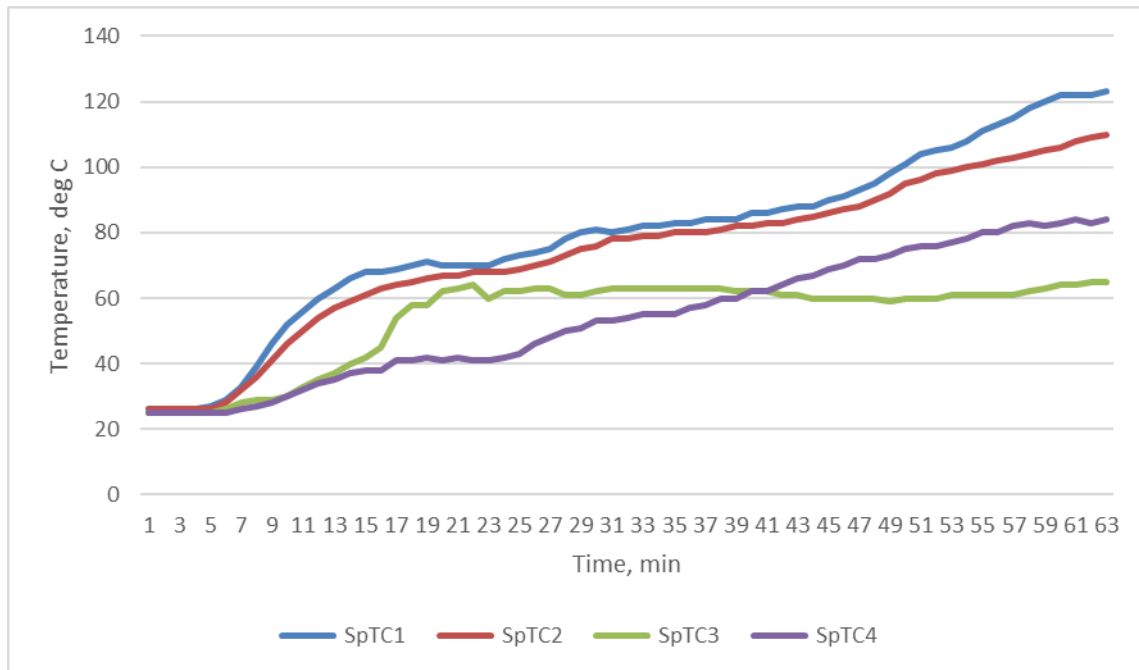


Fig. 3 – Specimen A. Thermocouples data

10.2 Specimen B

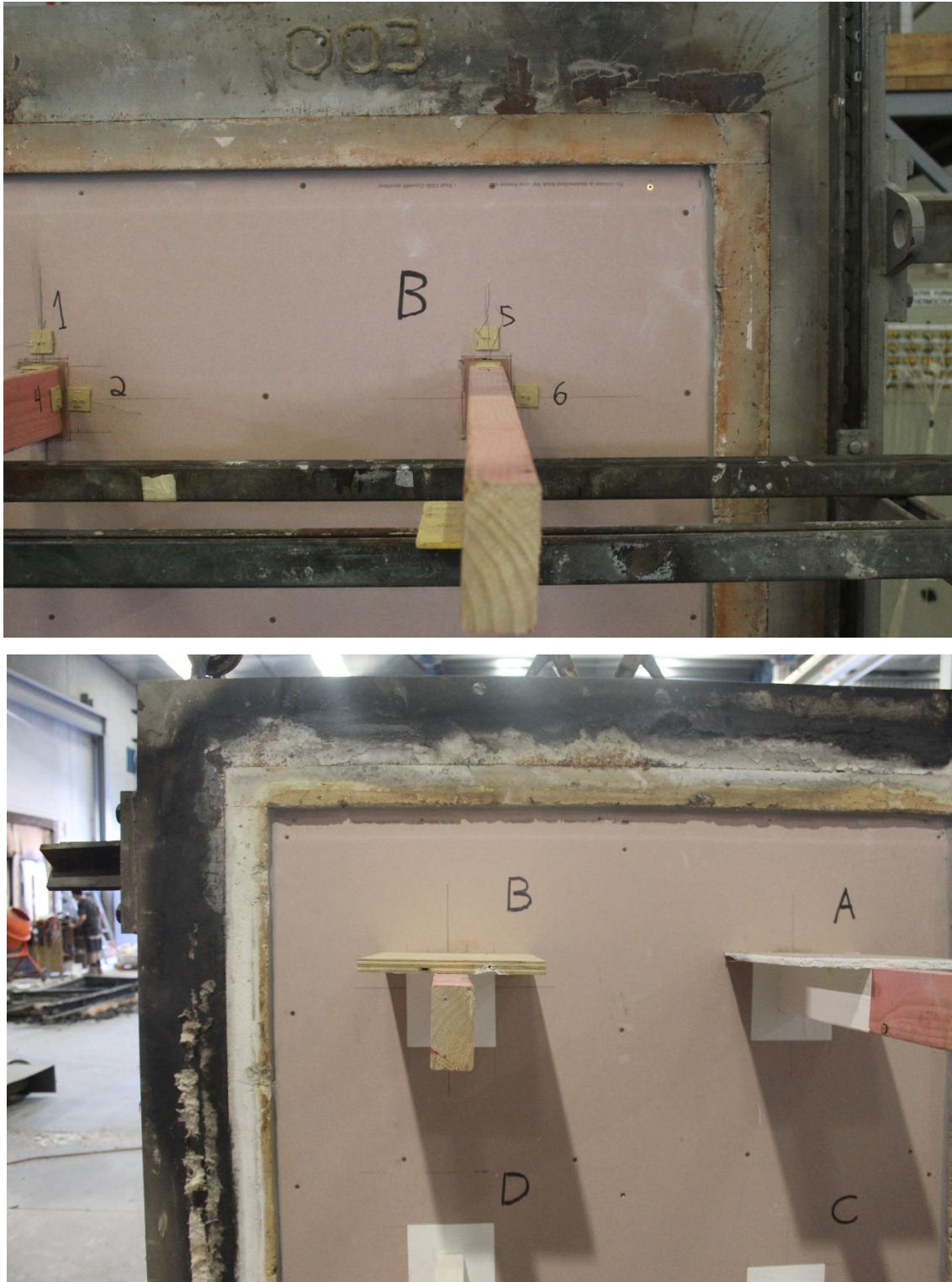


Fig. 4 – Specimen B. Unexposed (top) and exposed (bottom) face.

Penetration System		
B	Service	90x45mm Timber Purlin with 19mm plywood on the top (fire side only)
	System Details	Purlin (2.1), Sealant (3.1), Coating (3.2), Screws (4.2), Plywood (5.2)
	Service Support	Unistrut structure at 300mm and 1000mm
	Aperture Size	62mm x 105mm
	Annular Spacing	Min: 5mm Max: 10mm
	Local Fire-stopping Protection	
	Application	Asymmetrical
	Protection Used	<p>The aperture was cut from the separating element, through both faces of the plasterboard. The purlin (2.1) was passed through the aperture, extending 500mm from the exposed face. A bead of sealant (3.1) was applied between the purlin and the separating element, flush with the plasterboard, resulting in a 13mm depth and 5 to 10mm width seal around the service in the annular gap. A plywood pattress (5.2) was then cut to 300mm x 200mm, and fixed with three screws (4.2) to the top of the timber purlin on the exposed face. The pattress was flush with the separating element, and overhung the width of the purlin evenly.</p> <p>A coat of FBL-100 coating (3.2) was applied to the purlin and the pattress, with a WFT measurement of 1000µm. The coating was applied to all visible sides of the purlin. The coating was applied to the underside of the pattress, measuring 50mm either side of the purlin. The coating extended 300mm from the exposed face.</p>

Test results

Structural adequacy	Not applicable
Integrity	No failure at 62 min
Insulation	60 min

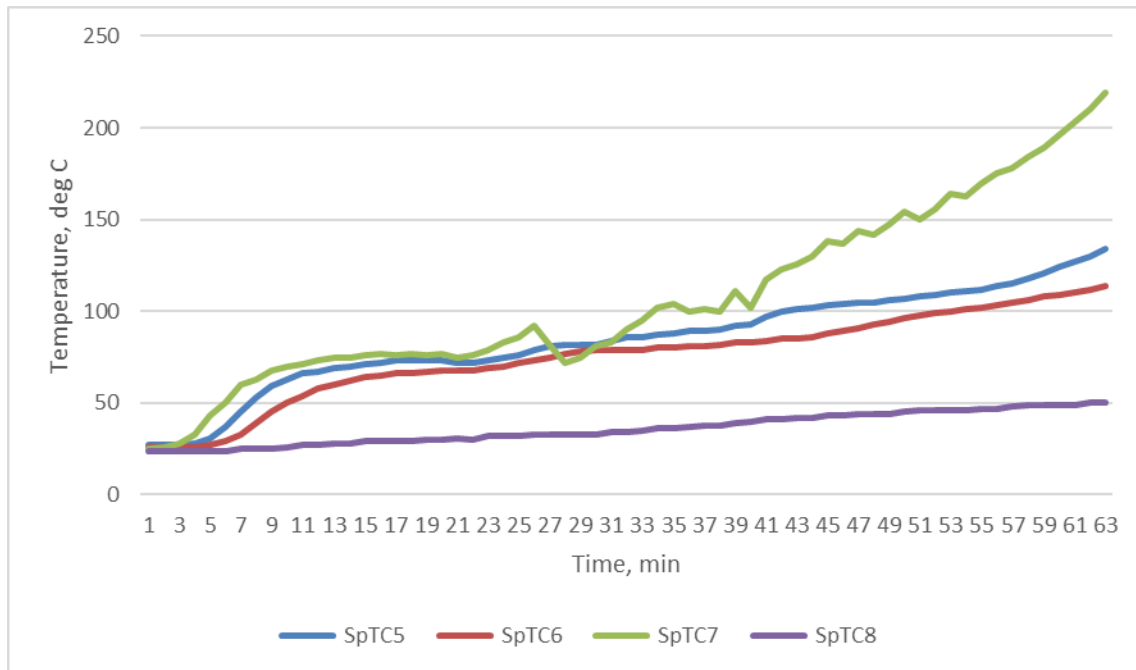


Fig. 5 – Specimen B. Thermocouples data.

10.3 Specimen C

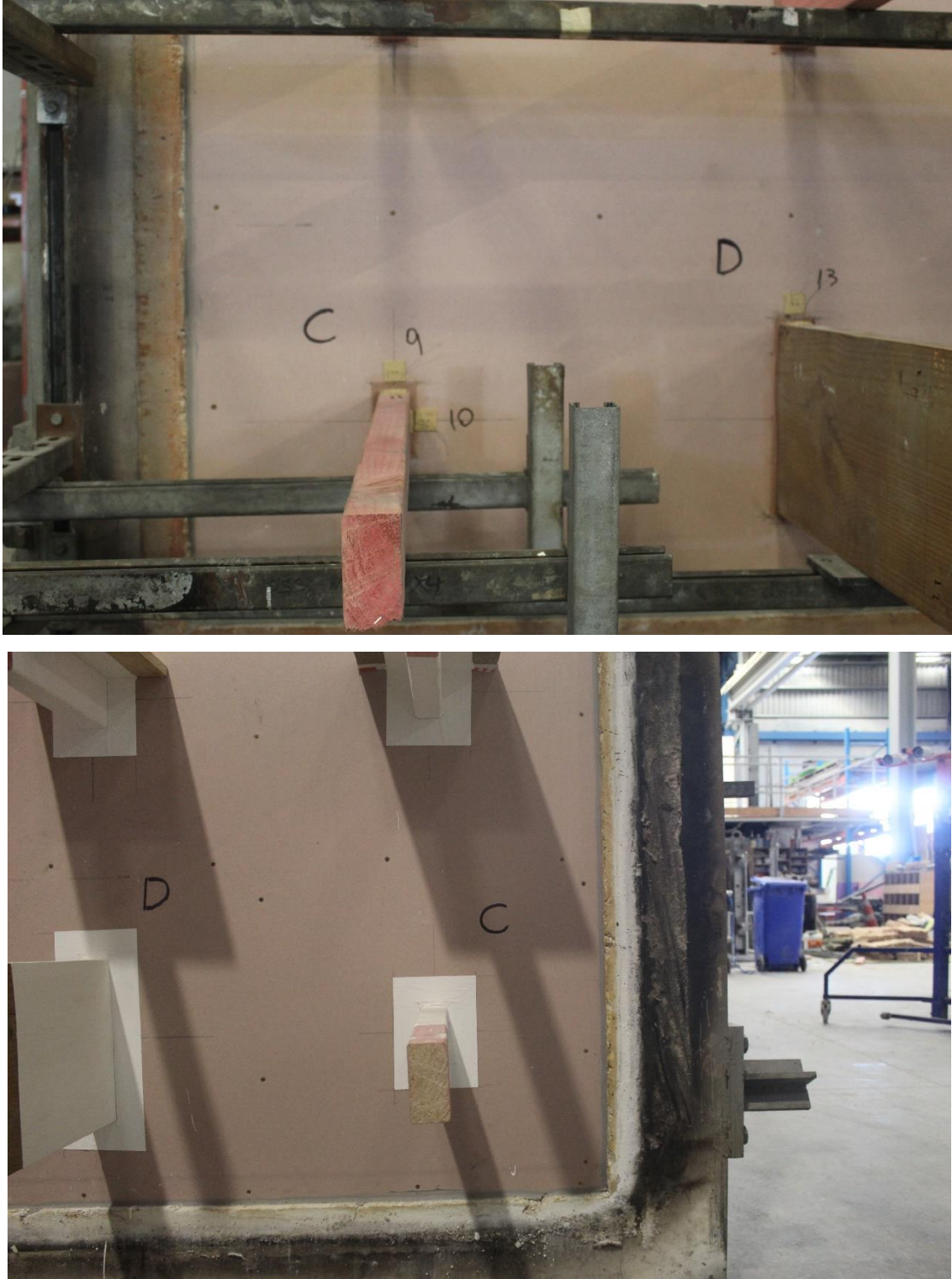


Fig. 6 – Specimen C. Unexposed (top) and exposed (bottom) face.

Penetration System		
C	Service	90x45mm Timber Purlin
	System Details	Purlin (2.1), Sealant (3.1), Coating (3.2)
	Service Support	Unistrut structure at 300mm and 1000mm
	Aperture Size	62mm x 105mm
	Annular Spacing	Min: 5mm Max: 10mm
	Local Fire-stopping Protection	
	Application	Asymmetrical
	Protection Used	<p>The aperture was cut from the separating element, through both faces of the plasterboard. The purlin (2.1) was passed through the aperture, extending 500mm from the exposed face. A bead of sealant (3.1) was applied between the purlin and the separating element, flush with the plasterboard, resulting in a 13mm depth and 5 to 10mm width seal around the service in the annular gap.</p> <p>A coat of FBL-100 coating (3.2) was applied to the purlin and the pattrass, with a WFT measurement of 1000µm. The coating was applied to all sides of the purlin. The coating extended 300mm from the exposed face.</p>

Test results

Structural adequacy	Not applicable
Integrity	No failure at 62 min
Insulation	No failure at 62 min

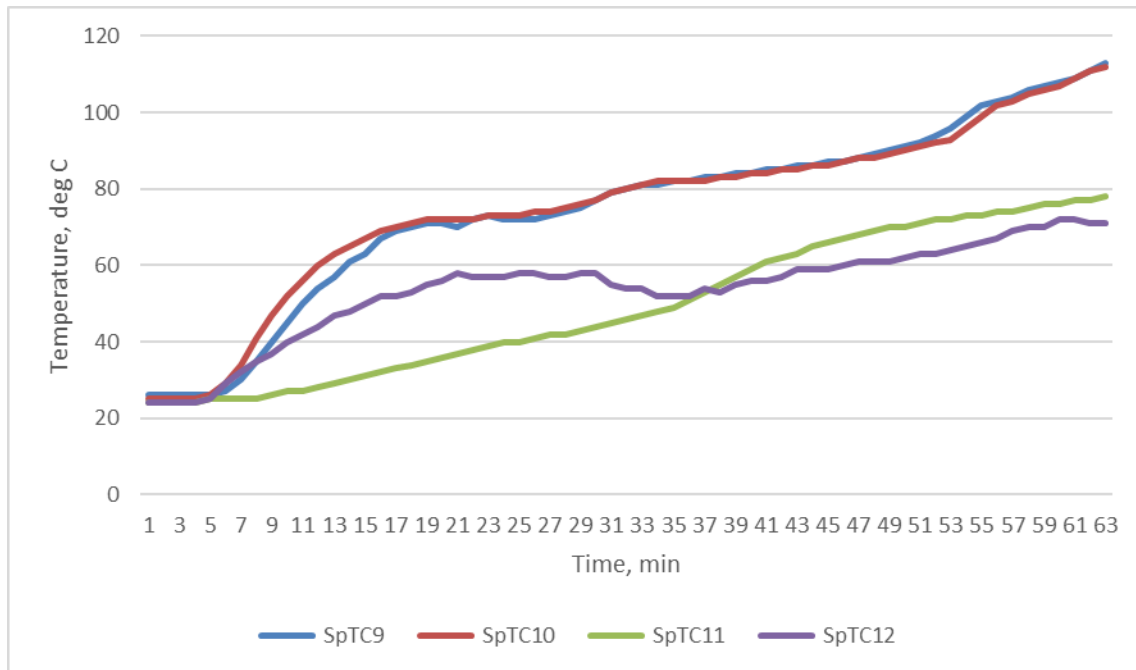


Fig. 7 – Specimen C. Thermocouples data.

10.4 Specimen D

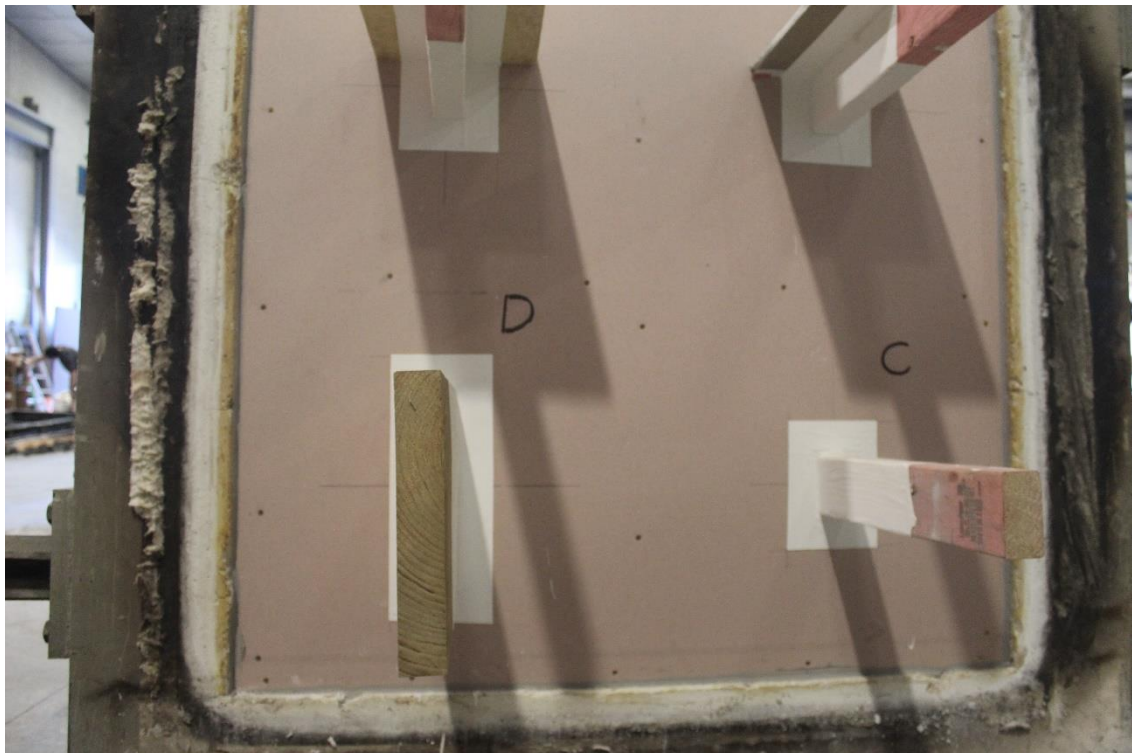


Fig. 8 – Specimen D. Unexposed (top) and exposed (bottom) face.

Penetration System		
D	Service	283x45mm Timber Purlin
	System Details	Purlin (2.2), Sealant (3.1), Coating (3.2)
	Service Support	Unistrut structure at 300mm and 1000mm
	Aperture Size	62mm x 300mm
	Annular Spacing	Min: 5mm Max: 10mm
Local Fire-stopping Protection		
	Application	Asymmetrical
	Protection Used	<p>The aperture was cut from the separating element, through both faces of the plasterboard. The purlin (2.2) was passed through the aperture, extending 500mm from the exposed face. A bead of sealant (3.1) was applied between the purlin and the separating element, flush with the plasterboard, resulting in a 13mm depth and 5 to 10mm width seal around the service in the annular gap.</p> <p>A coat of FBL-100 coating (3.2) was applied to the purlin and the pattrass, with a WFT measurement of 1000µm. The coating was applied to all sides of the purlin. The coating extended 300mm from the exposed face.</p>

Test results

Structural adequacy	Not applicable
Integrity	No failure at 62 min
Insulation	No failure at 62 min

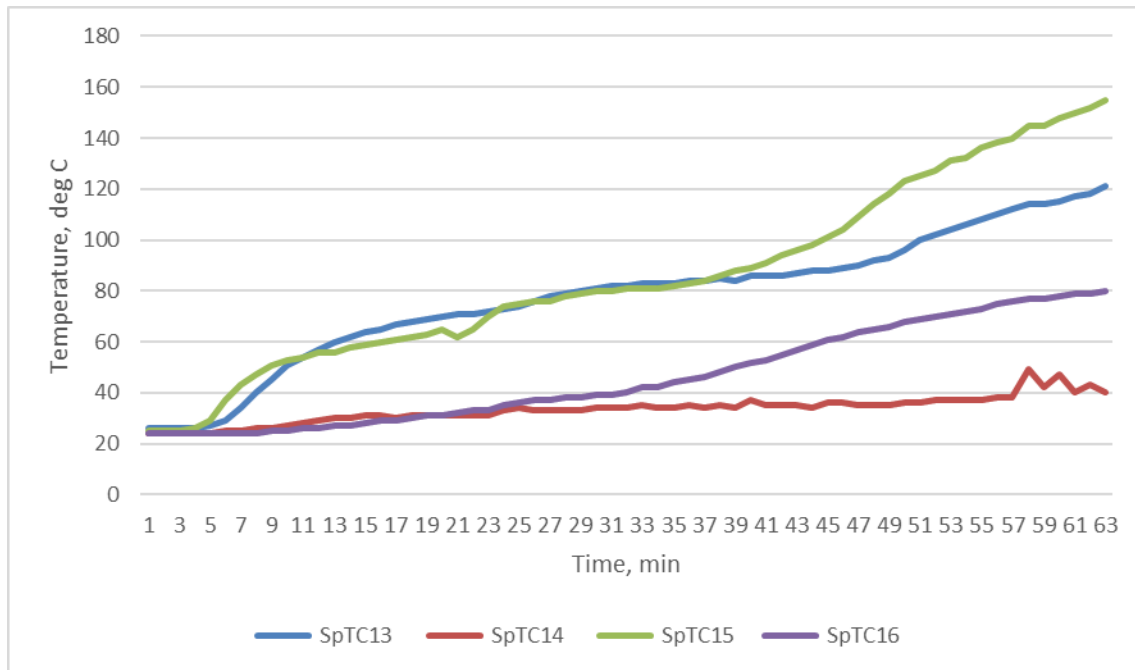


Fig. 9 – Specimen D. Thermocouples data.

11. Additional photographs

11.1 During and after the test

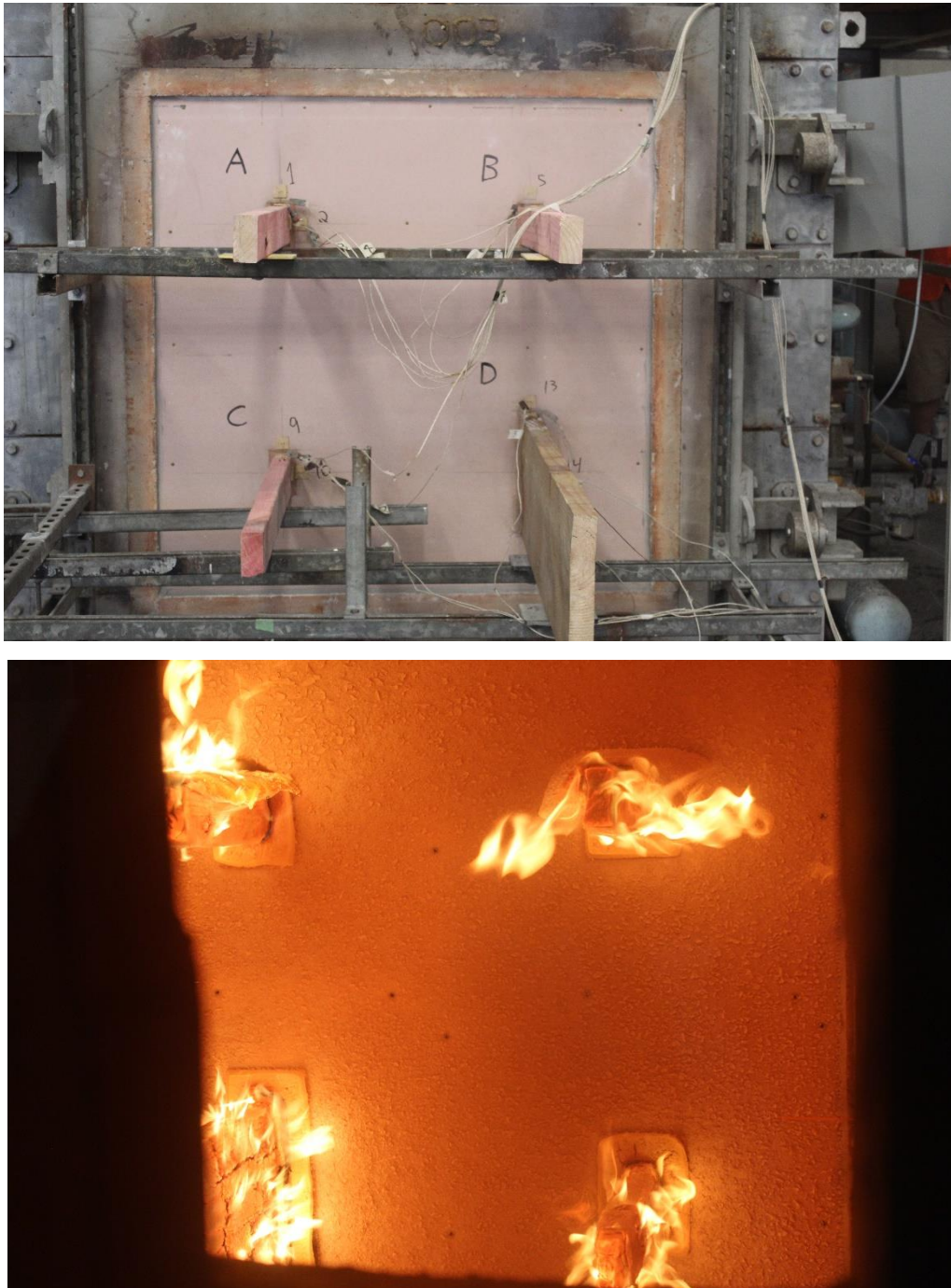


Fig. 10 – 30 minutes

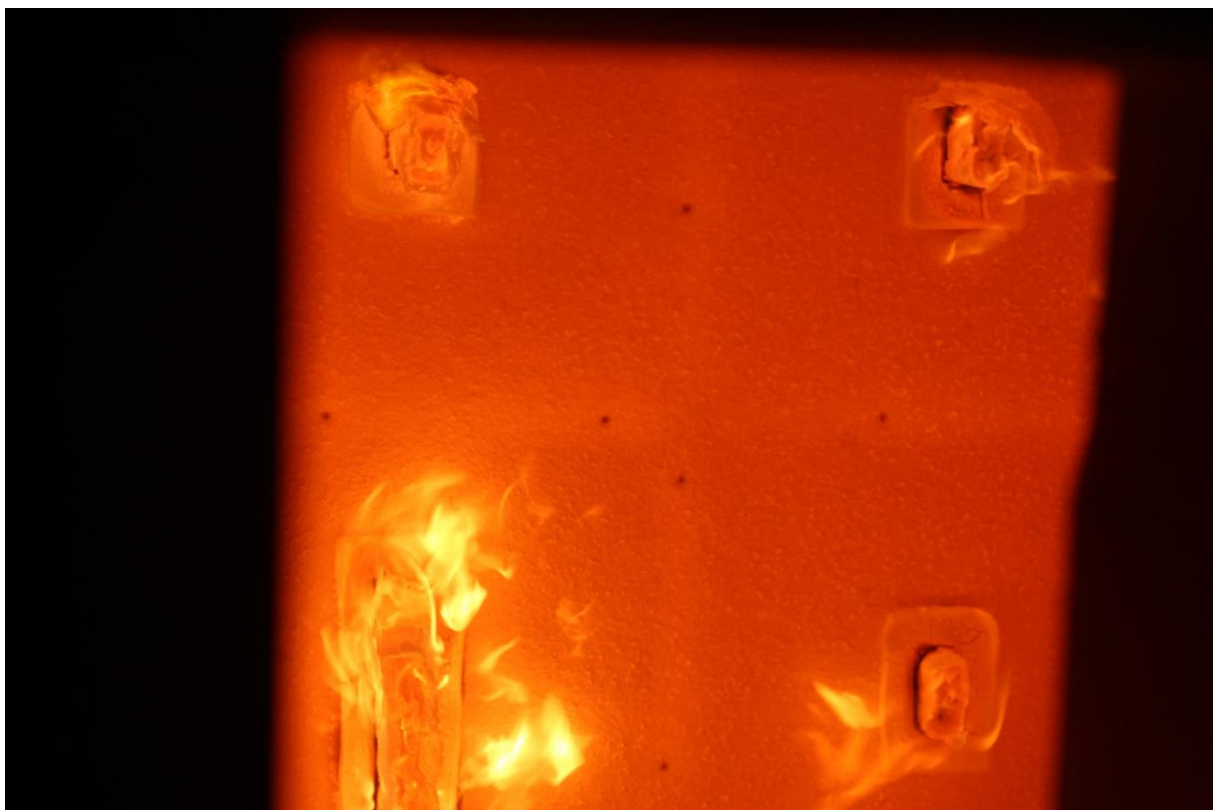
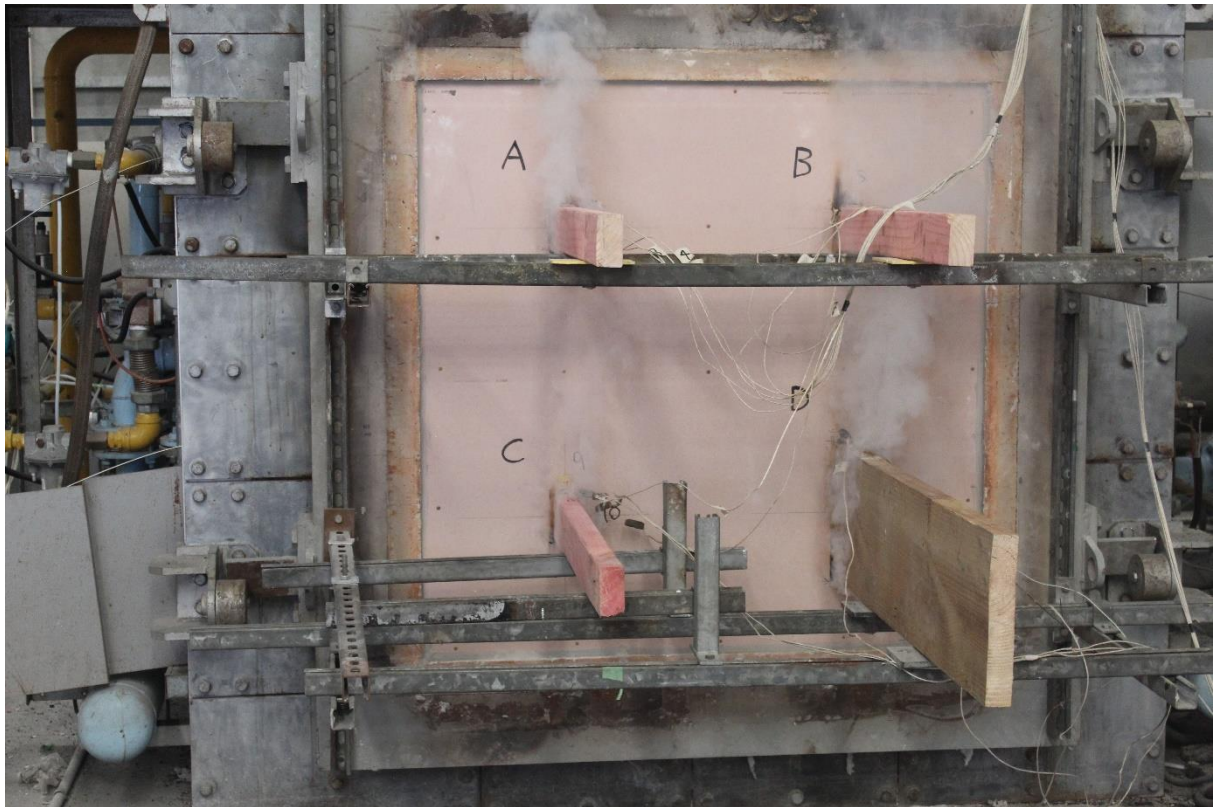


Fig. 11 – 60 minutes

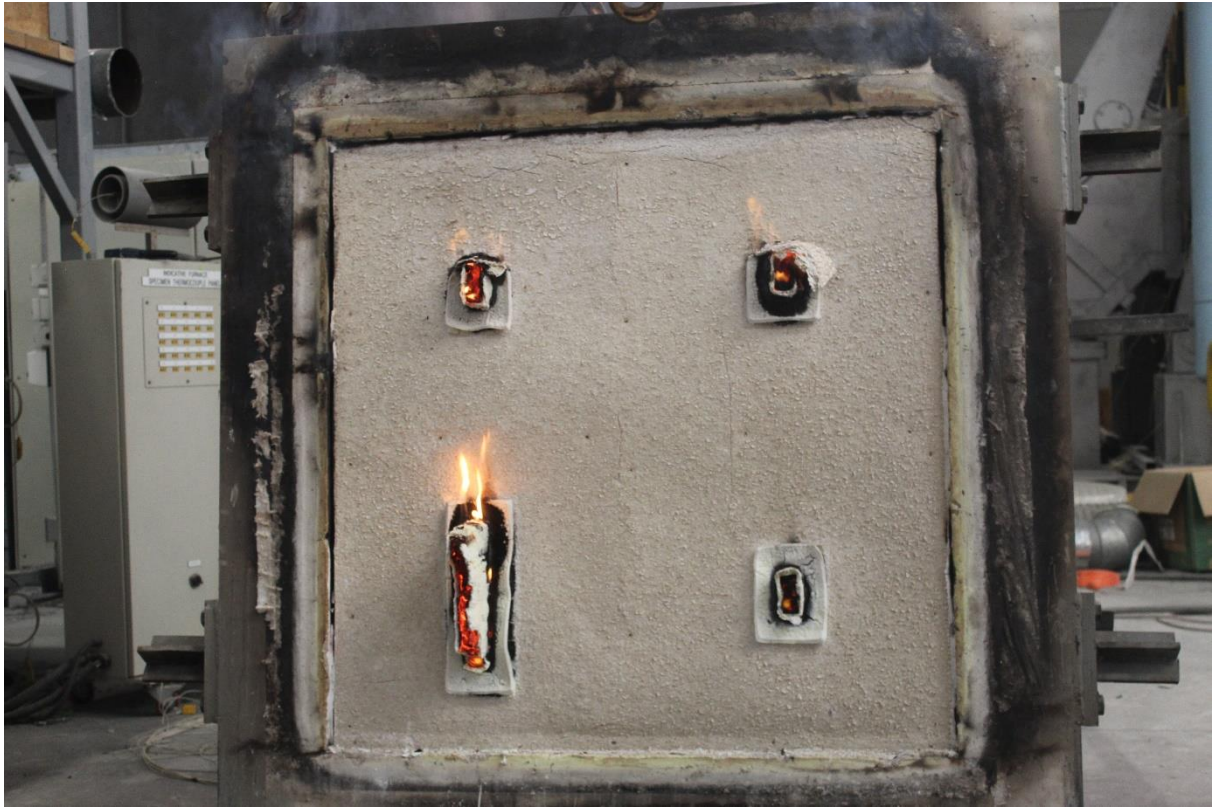


Fig. 12 – After the test